ELLIPSE
DPP - 1

1. The eccentricity of the ellipse $9x^2 + 5y^2 - 30y = 0$ is-
(A) 1/3 (B) 2/3 (C) 3/4 (D) None of these

2. If the latus rectum of an ellipse be equal to half of its minor axis, then its eccentricity is-
(A) 3/2 (B) $\sqrt{3}/2$ (C) 2/3 (D) $\sqrt{2}/3$

3. If distance between the directrices be thrice the distance between the foci, then eccentricity of ellipse is-
(A) 1/2 (B) 2/3 (C) $1/\sqrt{3}$ (D) 4/5

4. If the eccentricity of an ellipse be 5/8 and the distance between its foci be 10, then its latus rectum is
(A) $\frac{39}{4}$ (B) 12 (C) 15 (D) $\frac{37}{2}$

5. The equation of the ellipse whose centre is at origin and which passes through the points (–3, 1) and (2, –2) is -
(A) $5x^2 + 3y^2 = 32$ (B) $3x^2 + 5y^2 = 32$
(C) $5x^2 - 3y^2 = 32$ (D) $3x^2 + 5y^2 + 32 = 0$

6. The equation of the ellipse (referred to its axes as the axes of x and y respectively) which passes through the point (– 3, 1) and has eccentricity $\sqrt{\frac{2}{5}}$, is-
(A) $3x^2 + 6y^2 = 33$ (B) $5x^2 + 3y^2 = 48$
(C) $3x^2 + 5y^2 - 32 = 0$ (D) None of these

7. The latus rectum of an ellipse is 10 and the minor axis is equal to the distance between the foci. The equation of the ellipse is-
(A) $x^2 + 2y^2 = 100$ (B) $x^2 + \sqrt{2}\,y^2 = 10$
(C) $x^2 - 2y^2 = 100$ (D) None of these

8. If the distance between the foci of an ellipse be equal to its minor axis, then its eccentricity is-
(A) 1/2 (B) $1/\sqrt{2}$ (C) 1/3 (D) $1/\sqrt{3}$

Multiple Correct

9. In an ellipse the distance between its foci is 6 and its minor axis is 8. Then its eccentricity is not equal to-
(A) $\frac{4}{5}$ (B) $\frac{1}{\sqrt{52}}$ (C) $\frac{3}{5}$ (D) $\frac{1}{2}$

10. The equation of the ellipse whose centre is (2,– 3), one of the foci is (3,– 3) and the corresponding vertex is (4,– 3) is $\frac{(x-a)^2}{4} + \frac{(y+b)^2}{3} = 1$ ($a,b \in N$) then -
(A) $a + b = 1$ (B) $a + b = 5$ (C) $a - b = 1$ (D) $|a - b| = 1$

ELLIPSE
DPP - 2

1. If the straight line y = 4x + c is a tangent to the ellipse $\frac{x^2}{8} + \frac{y^2}{4} = 1$, then c will be equal to-

(A) ± 4 (B) ± 6 (C) ± 1 (D) None of these

2. Find the equation of the tangent to the ellipse $x^2 + 2y^2 = 4$ at the points where ordinate is 1.

(A) $x + \sqrt{2}y - 2\sqrt{2} = 0$ & $x - \sqrt{2}y + 2\sqrt{2} = 0$

(B) $x - \sqrt{2}y - 2\sqrt{2} = 0$ & $x - \sqrt{2}y + 2\sqrt{2} = 0$

(C) $x + \sqrt{2}y + 2\sqrt{2} = 0$ & $x + \sqrt{2}y + 2\sqrt{2} = 0$

(D) None of these

3. Find the equations of tangents to the ellipse $9x^2 + 16y^2 = 144$ which pass through the point (2,3).

(A) y = 3 and y = −x + 5 (B) y = 5 and y = −x + 3

(C) y = 3 and y = x − 5 (D) None of these

4. If y = mx + c is tangent on the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$, then the value of c is-

(A) 0 (B) 3/m (C) $\pm\sqrt{9m^2+4}$ (D) $\pm 3\sqrt{1+m^2}$

5. The equation of tangent to the ellipse $x^2 + 3y^2 = 3$ which is $\perp^r$ to line 4y = x − 5 is-

(A) 4x + y + 7 = 0 (B) 2x + y − 7 = 0 (C) 4x + y − 3 = 0 (D) None of these

6. Tangents are drawn from a point on the circle $x^2 + y^2 = 25$ to the ellipse $9x^2 + 16y^2 - 144 = 0$ then find the angle between the tangents.

(A) π/2 (B) π/3 (C) π/8 (D) π/5

7. Two perpendicular tangents drawn to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ intersect on the curve -

(A) x = a/e (B) $x^2 + y^2 = 41$ (C) $x^2 + y^2 = 9$ (D) $x^2 - y^2 = 41$

8. From the point (λ, 3) tangents are drawn to $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and are perpendicular to each other then λ =

(A) ± 1 (B) ± 2 (C) ± 3 (D) ± 4

Integer Type

9. Let P be a variable point on the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ with foci S and S′. If A be the area of triangle PSS′, then maximum value of A is–

10. A tangent having slope $-\frac{4}{3}$ to the ellipse $\frac{x^2}{18} + \frac{y^2}{32} = 1$, intersects the axis of x & y in points A & B respectively. If O is the origin, find the area of triangle OAB.

ELLIPSE
DPP - 3

1. PQ is a double ordinate of the ellipse $x^2 + 9y^2 = 9$, the normal at P meets the diameter through Q at R, then the locus of the mid point of PR is
(A) a circle (B) a parabola (C) an ellipse (D) a hyperbola

2. $x - 2y + 4 = 0$ is a common tangent to $y^2 = 4x$ & $\frac{x^2}{4} + \frac{y^2}{b^2} = 1$. Then the value of b and the other common tangent are given by :
(A) $b = \sqrt{3}$; $x + 2y + 4 = 0$ (B) $b = 3$; $x + 2y + 4 = 0$
(C) $b = \sqrt{3}$; $x + 2y - 4 = 0$ (D) $b = \sqrt{3}$; $x - 2y - 4=0$

3. Given ellipse $x^2 + 4y^2 = 16$ and parabola $y^2 - 4x - 4 = 0$. The quadratic equation whose roots are the slopes of the common tangents to parabola and ellipse, is
(A) $3x^2 - 1 = 0$ (B) $5x^2 - 1 = 0$
(C) $15x^2 + 2x - 1 = 0$ (D) $2x^2 - 1 = 0$

4. Extremities of the latera recta of the ellipses $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $(a > b)$ having a given major axis 2a lies on
(A) $x^2 = a(a - y)$ (B) $x^2 = a(a^2 + y)$ (C) $y^2 = a(a + x)$ (D) $y^2 = a(a - x)$

5. If a focal chord of an ellipse $y^2 = b^2(1 - x^2)$ cuts the ellipse at the points whose eccentric angles are $\frac{5\pi}{12}$ and $\frac{23\pi}{12}$, then the value of $b(b < 1)$ is
(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{1}{2}$ (D) $\frac{5}{2\sqrt{10}}$

6. The equation of tangents to the ellipse $9x^2 + 16y^2 = 144$ which pass through the point (2, 3)-
(A) $y = 3$ (B) $x + y = 2$ (C) $x - y = 3$ (D) $y = 3$; $x + y = 5$

7. P is a point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. The in-radius of ΔPSS' (S and S' are focii), where its area is maximum.
(A) $\frac{be}{1+e}$ (B) $\frac{b(1+e)}{e}$ (C) $\frac{ae}{1+e}$ (D) None of these

8. If a circle of radius r is concentric with ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then common tangent is inclined to the major axis at an angle-
(A) $\tan^{-1}\sqrt{\frac{r^2 - b^2}{a^2 - r^2}}$ (B) $\tan^{-1}\sqrt{\frac{r^2 - b^2}{r^2 - a^2}}$ (C) $\tan^{-1}\sqrt{\frac{a^2 - r^2}{r^2 - b^2}}$ (D) None of these

Integer Type

9. A point P moves on the ellipse $\frac{x^2}{4}+\frac{y^2}{3}=1$ above the x-axis and points Q and R are moving respectively on the circles $(x-1)^2+y^2=1$ and $(x+1)^2+y^2=1$ below x-axis. Find maximum value of (PQ + PR).

10. A circle has the same centre as an ellipse & passes through the foci F_1 & F_2 of the ellipse, such that the two curves intersect in 4 points. Let 'P' be any one of their point of intersection. If the major axis of the ellipse is 17 & the area of the triangle PF_1F_2 is 30, then the distance between the foci is :

ELLIPSE
DPP - 4

1. The equation of the chord of the ellipse $2x^2 + 5y^2 = 20$ which is bisected at the point (2,1) is-
(A) $4x + 5y + 13 = 0$ (B) $4x + 5y = 13$
(C) $5x + 4y + 13 = 0$ (D) None of these

2. The locus of mid-points of a focal chord of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$ is-

(A) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{ex}{a}$ (B) $\frac{x^2}{a^2}-\frac{y^2}{b^2}=\frac{ex}{a}$ (C) $x^2 + y^2 = a^2 + b^2$ (D) None of these

3. The tangent at P on the ellipse meets the minor axis in Q, and PR is drawn perpendicular to the minor axis and C is the centre. Then CQ . CR =
(A) b^2 (B) $2b^2$ (C) a^2 (D) $2a^2$

4. The length of the common chord of the ellipse $\frac{(x-1)^2}{9}+\frac{(y-2)^2}{4}=1$ and the circle $(x-1)^2 + (y-2)^2 = 1$ is
(A) 0 (B) 1 (C) 3 (D) 8

5. If any tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ intercepts equal lengths ℓ on the axes, then ℓ =

(A) $\sqrt{a^2+b^2}$ (B) $a^2 + b^2$ (C) $(a^2 + b^2)^2$ (D) None of these

6. If tangents to the parabola $y^2 = 4ax$ intersect the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at A and B, the find the locus of point of intersection of tangents at A and B.

(A) $y^2 = -\frac{b^2}{a}.x$ (B) $y^2 = -\frac{b^3}{a^2}.x$ (C) $y^2 = -\frac{b^4}{a^3}.x$ (D) $y^2 = -\frac{b}{a}.x$

7. If $\tan\theta_1 \tan\theta_2 = -\frac{a^2}{b^2}$, then the chord joining two point θ_1 and θ_2 on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ will subtend a right angle at
(A) Focus (B) Centre
(C) End of the major axes (D) End of minor axes

8. Chords of an ellipse are drawn through the positive end of the minor axes. Then their mid point lies on -
(A) a circle (B) a parabola (C) an ellipse (D) a hyperbola

Paragraph for question nos. 9 to 11

Common tangents are drawn to $C_1 : x^2 + y^2 = 16$ and $C_2 : 4x^2 + 25y^2 = 100$.

9. The x-intercept of common tangent of curves C_1 and C_2 having negative gradient in the first quadrant is

(A) $2\sqrt{7}$ (B) $\frac{-4\sqrt{7}}{\sqrt{3}}$ (C) $-2\sqrt{7}$ (D) $\frac{4\sqrt{7}}{\sqrt{3}}$

10. Area of quadrilateral formed by common tangents between C_1 and C_2 is

(A) $\frac{142\sqrt{3}}{3}$ (B) $\frac{112}{3}\sqrt{3}$ (C) $\frac{92}{3}\sqrt{3}$ (D) $\frac{62}{3}\sqrt{3}$

11. If tangents are drawn from any point on director circle of C_1 to auxiliary circle of C_2, then locus of mid-points of chords of contact is

(A) $x^2 + y^2 = \frac{625}{12}$ (B) $x^2 + y^2 = \frac{625}{24}$ (C) $x^2 + y^2 = \frac{625}{16}$ (D) $x^2 + y^2 = \frac{625}{32}$

PASSAGE : 12 to 13

A parabola P : $y^2 = 8x$, ellipse E : $\frac{x^2}{4} + \frac{y^2}{15} = 1$.

12. Equation of a tangent common to both the parabola P and the ellipse E is

(A) $x - 2y + 8 = 0$ (B) $2x - y + 8 = 0$ (C) $x + 2y - 8 = 0$ (D) $2x - y - 8 = 0$

13. Point of contact of a common tangent to P and E on the ellipse is

(A) $\left(\frac{1}{2}, \frac{15}{4}\right)$ (B) $\left(-\frac{1}{2}, \frac{15}{4}\right)$ (C) $\left(\frac{1}{2}, -\frac{15}{2}\right)$ (D) $\left(-\frac{1}{2}, -\frac{15}{2}\right)$